

ES

EXECUTIVE SUMMARY

PROPOSED 2-ETHYLHEXANOIC ACID II PLANT IN EXISTING INTEGRATED CHEMICAL SITE OF BASF PETRONAS CHEMICALS, GEBENG, KUANTAN PAHANG

1 | INTRODUCTION

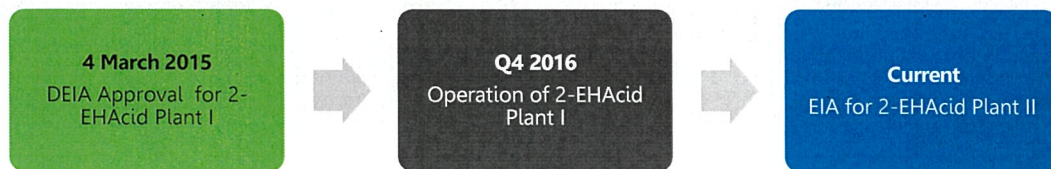
PROJECT BACKGROUND

BASF PETRONAS Chemicals Sdn. Bhd. (BPC) is a joint venture between BASF SE of Germany and Malaysia's PETRONAS Chemicals Group (PCG).

Incorporated in August 1997, the company operates an Integrated Chemical Site (ICS) situated at the Gebeng Industrial Estate, Pahang, and currently has 14 fully integrated plants, with key products include:

- Acrylic Monomers;
- Oxo Products;
- Highly Reactive Polyisobutene;
- Aroma Ingredients; and
- 2-Ethylhexanoic Acid (2-EHAcid).

The first 2-EHAcid plant is currently in operation after commissioned in Q4 of 2016. The Project, which is a **second 2-EHAcid plant**, will be constructed right next to it.



PROJECT PROPONENT



BASF PETRONAS Chemicals Sdn. Bhd.
Jalan Gebeng 2/1,
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QUALIFIED PERSONS



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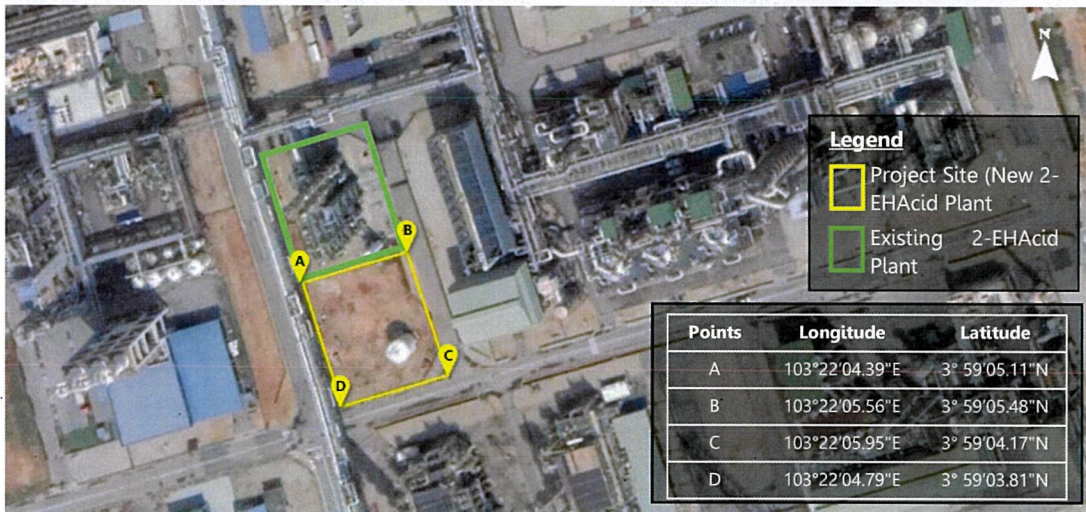
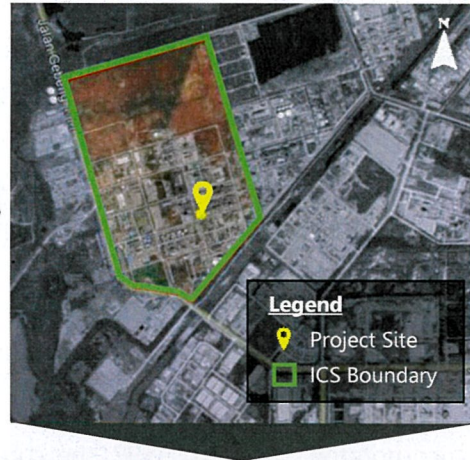
Fax : +603-80242320

Email : tyc@ere.com.my

PROJECT LOCATION

The Project site is located **within BPC's existing ICS at Gebeng Industrial Estate (GIE), Kuantan**. It will occupy a total area of approximately 0.088 ha (0.217 ac).

The Project is accessible via East Coast Expressway, Lebuhraya Pantai Timur (LPT), through Jabor exit, Gebeng Bypass and **Jalan Gebeng 1/11**.



LEGAL ASPECTS

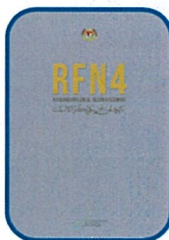
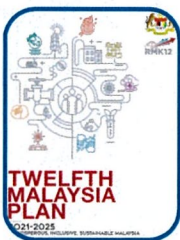


Second Schedule Prescribed Activity

Activity 6(d) Petrochemicals: Production capacity of each product or combined product of 50 tonnes or more per day


CONFORMANCE WITH POLICIES AND DEVELOPMENT PLANS

- Twelfth Malaysia Plan
- *Rancangan Fizikal Negara 4*
- *Rancangan Struktur Negeri Pahang 2050*
- *Rancangan Tempatan Daerah Kuantan 2035 (Penggantian)*
- East Coast Economic Region Master Plan 2.0



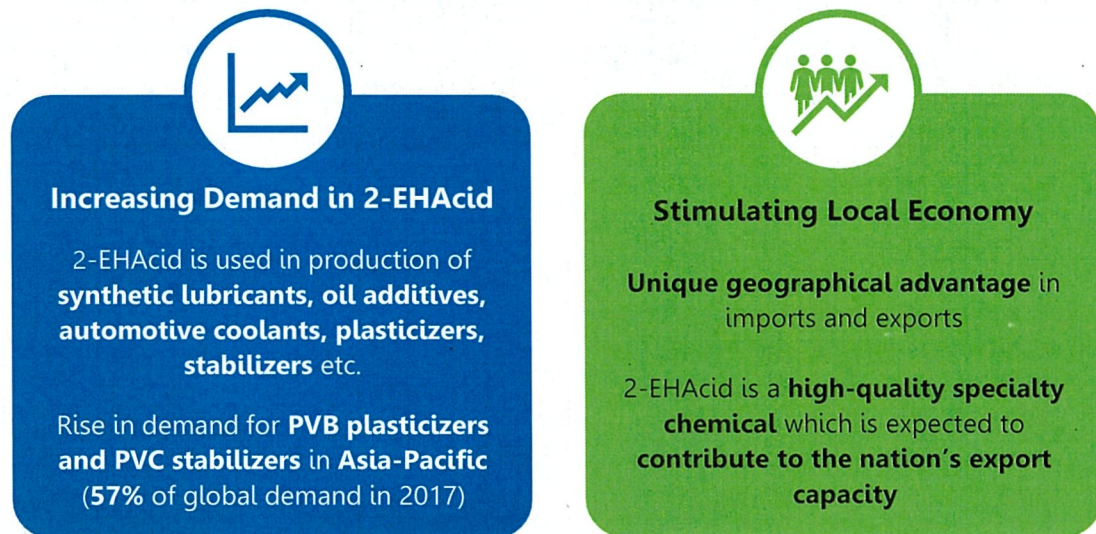
2 | TERMS OF REFERENCE

ENDORSEMENT OF TOR

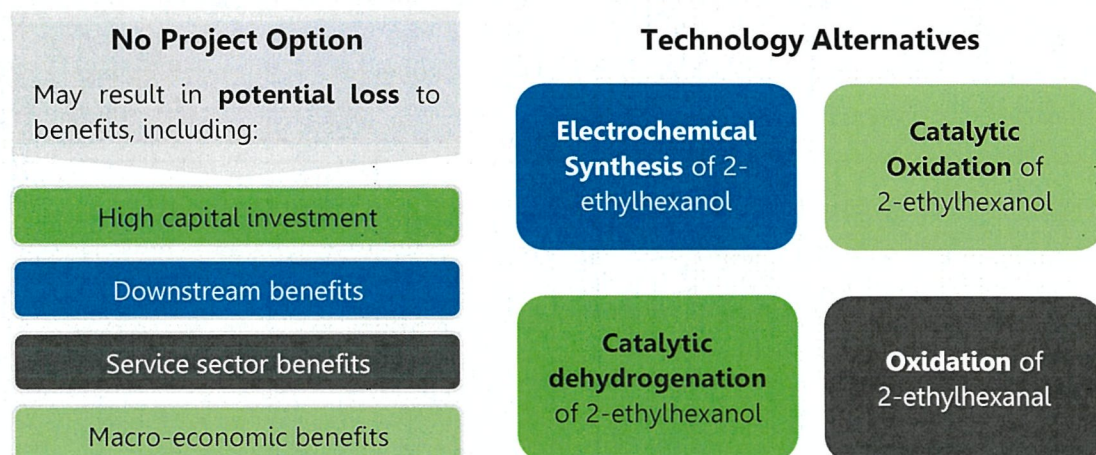
 The Revised TOR & ESI Report was submitted to DOE HQ on **25th April 2022**, and it was endorsed on **27th May 2022** (Ref: JAS.600-2/9/3 Jilid 2 (4)).



3 | STATEMENT OF NEED



4 | PROJECT OPTIONS



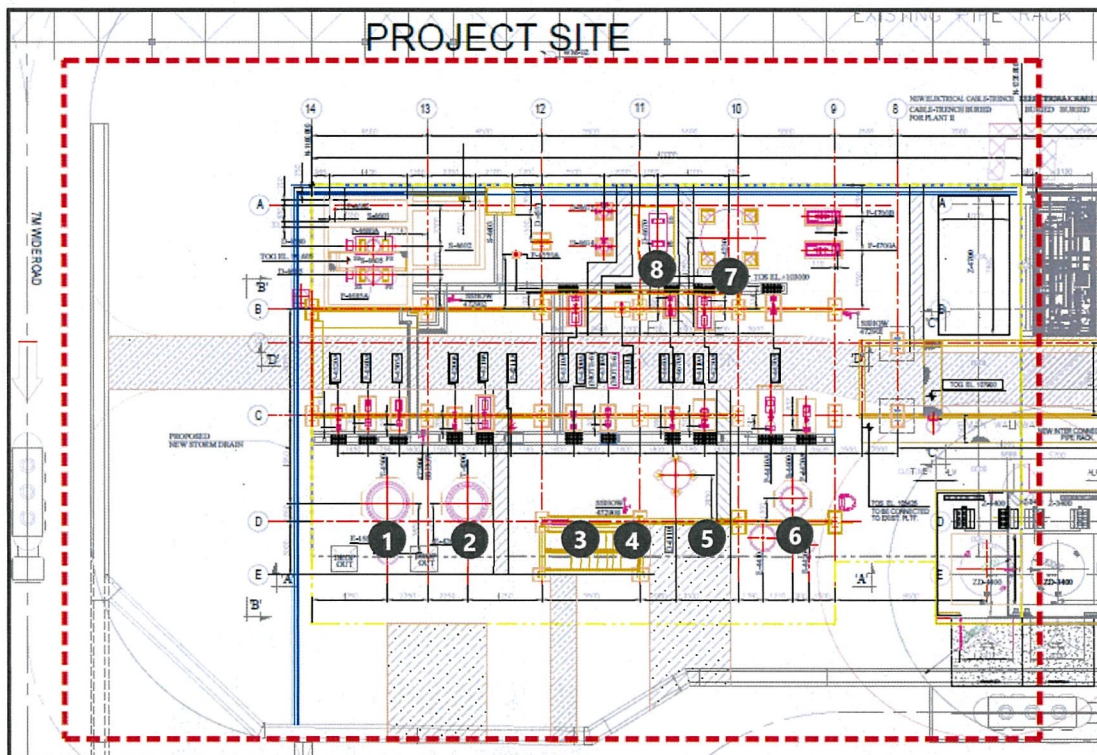
5 | PROJECT DESCRIPTION

PROJECT CONCEPT



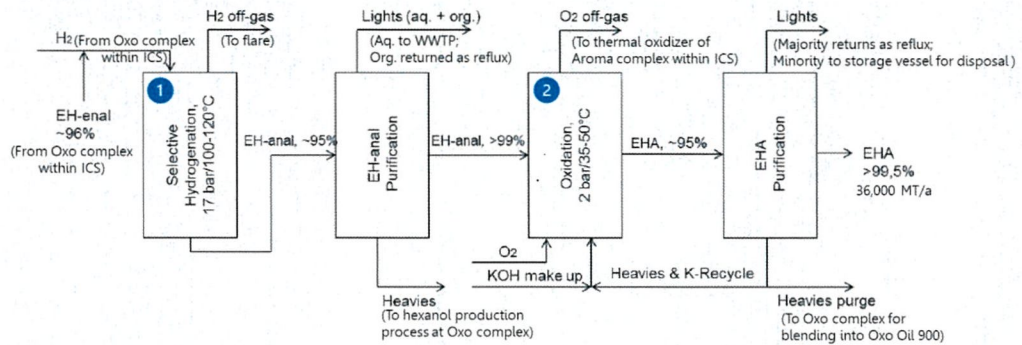
- New open air 2-EHAcid production plant (proposed max. production capacity of 36,000 MT/a)
- Modification of an existing tank farm
- Replacement of existing residue tank with new organic residue tank
- Addition of new loading arm
- Addition of feed pump
- Utilizing existing infrastructures and utilities of the Oxo facilities

PROJECT LAYOUT AND KEY COMPONENTS

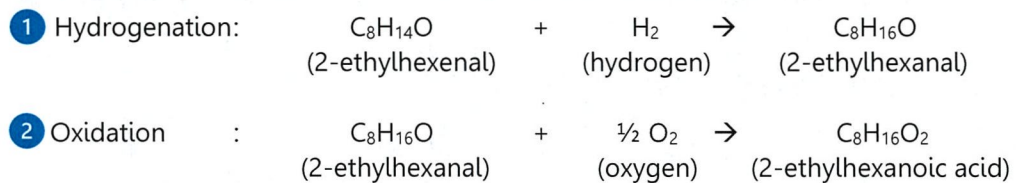


No.	Key Components
1	Rectification Tower (T 4500)
2	Hexanal Tower (T 4200)
3	Stripping Column (T 4450)
4	Hexanol Tower (T 4300)
5	Hydrogenation Reactor (R 4100)
6	Oxidation Reactor (R 4400)
7	Hexanal Buffer Drum (D 4230)
8	Organic Residue Drum (D 4670)

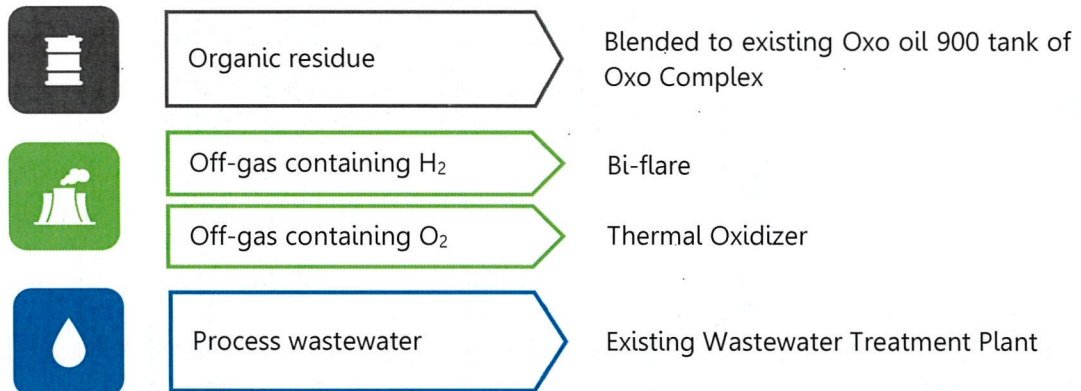
PROCESS DESCRIPTION



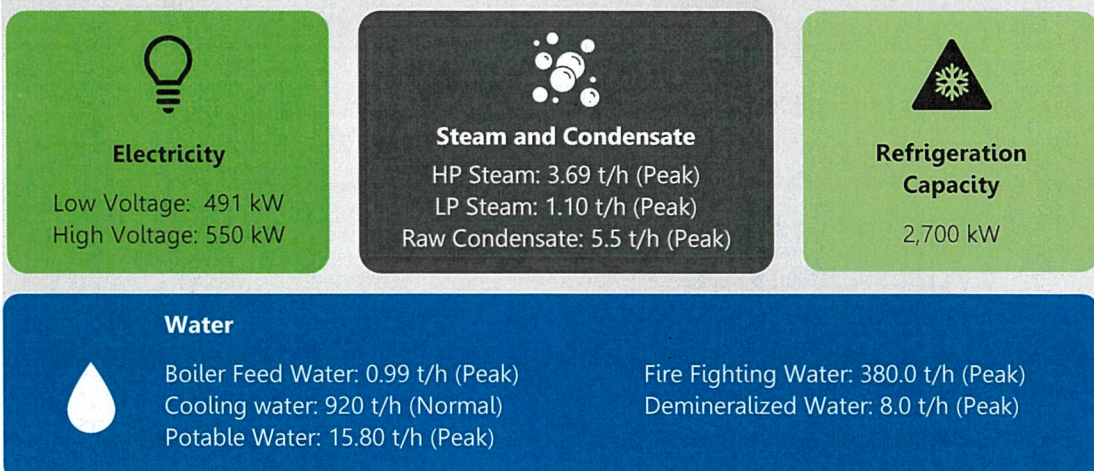
Chemical Reactions



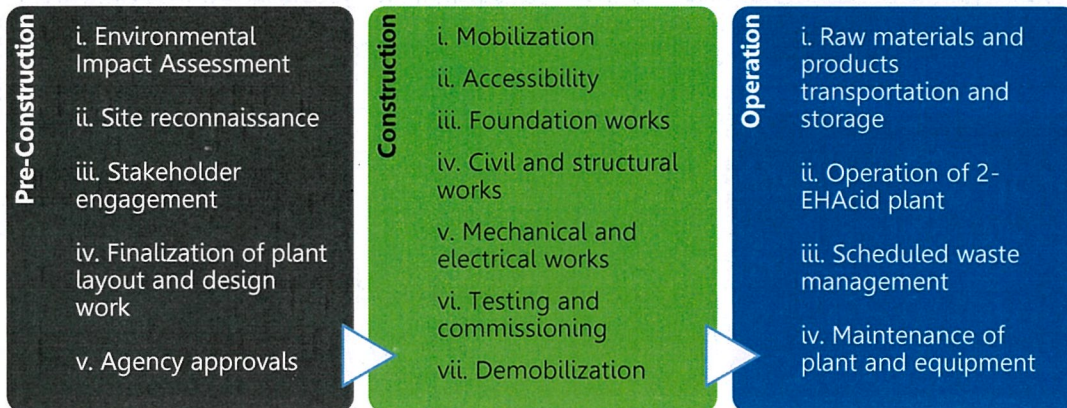
OFF-GAS AND WASTE MANAGEMENT



PLANT UTILITY

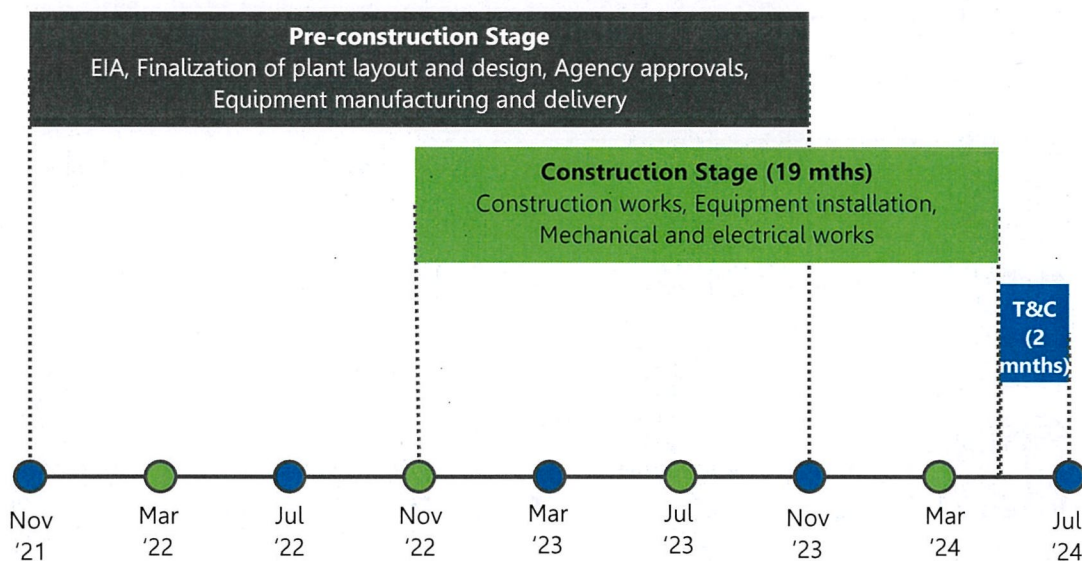


PRINCIPAL PROJECT ACTIVITIES



PROJECT IMPLEMENTATION SCHEDULE

The construction of the Project is expected to be **nineteen (19) months** (from November 2022 to May 2024), followed by the commissioning stage (T&C) of two (2) months.



6 | EXISTING ENVIRONMENT

PHYSICAL ENVIRONMENT

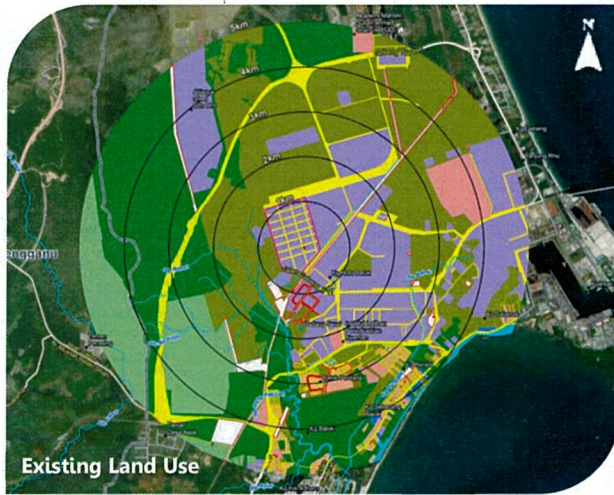
Topography & Terrain

Project site ranges from **10-20m above MSL**. It is already prepared to **platform level**.

Geology & Soil

Project site is underlain by predominantly **unconsolidated Quaternary alluvial sediments** and sits on **peat soil**.

LAND USE AND SENSITIVE RECEPTORS



Existing Land Use

Existing land use surrounding the Project site is comprised mainly of **industries, vacant lots and some residential areas** in the southwest direction.



Future Land Use

Land use within 5km radius of the Project site have been mostly gazette as **industrial areas** with a **few residential areas** down south.



Proposed Future Development

The Kuantan Port City (KPC) Draft Masterplan has also propose several major developments within the vicinity of the Project site, such as the **Kuantan Port City**.

LEGEND

Project Site	Major Road
ICS Boundary	Highway
Distance around Project Site	State Boundary
Minor Road	

Land Use

Residential	Transportation
Commercial	Infrastructure and Utilities
Industry	Agriculture
Institutional and Public Amenities	Forest
Open Space and Recreational	Water Bodies
Vacant Land	

CLIMATE



Temperature

Avg. annual 24-hour temp.: 26.8°C
Warmest months: May (avg. 27.8°C)
Coollest months: Dec & Jan (avg. 25.5°C)



Rainfall

Avg. annual rainfall: 2,975.3 mm
Avg. rain days: 186 days
Most rain days: Nov (23 days)
Least rain days: Feb (11 days)



Relative Humidity

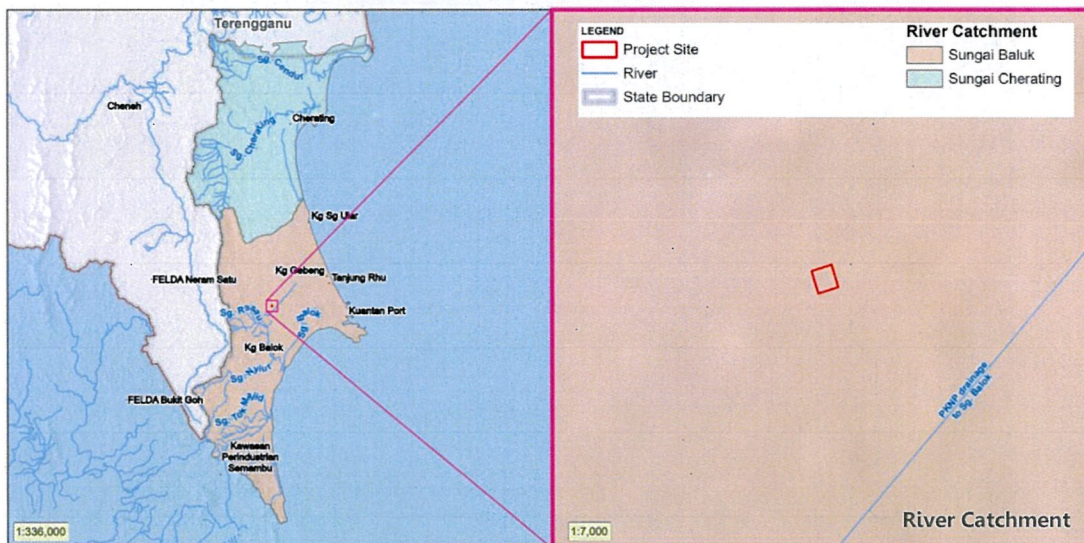
Avg. annual 24-hour mean RH: 84.8%
Highest RH: Nov (88.4%)
Lowest RH: Jul & Aug (83.2%)



Surface Wind

Predominant Wind: Northwest
Annual mean speed: 1.6 m/s
Calm period: 0.3 m/s (17.8% of the time)

HYDROLOGY AND DRAINAGE



The Project Site is located within the **Sg. Balok catchment**. The nearest river, **Sg. Balok**, is approximately 0.9km westward from the Project site, and will eventually discharge into the South China Sea.

Drainage System

Treated wastewater is discharged to **PKNP drainage** directly, then flow into **Sg. Balok**.

Surface run-off from within the ICS is collected via **on-site drainage channels** into a **retention pond** at the south of the Project site. It then discharges out into **PKNP's drainage**, which flows into **Sg. Balok**.



Flood Prone Area



Existing Flood Risk Mitigation and Action Plans

Flood Risk Strategy outlined in *RTD Kuantan 2035 (Penggantian)*

National Flood Forecasting and Warning Program (PRAB)

Flood Disaster Risk Assessment

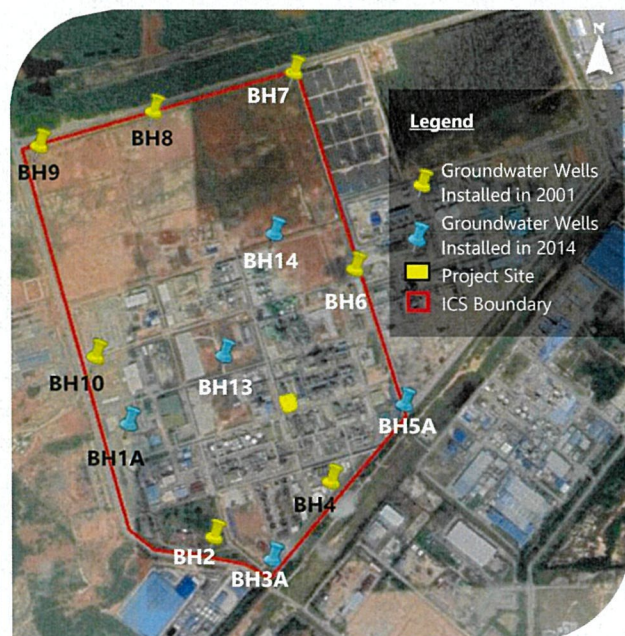
GROUNDWATER

Sampling in 2014

- All BHs except for BH9 was not sampled due to damage
- VOCs, SVOCs and TPH compounds were not detected
- Fe levels at BH2 and B14 higher than SSLs (26,000 µg/l)
- As levels at BH2 and BH8 higher than SSLs (0.045 µg/l)

Sampling in 2020

- Conducted at BH4 and BH5A
- Heavy metals were all below SSLs
- VOCs were all below 10 µg/l



ENVIRONMENTAL QUALITY



Water Quality

Seven (7) samples in total were collected from Sg. Balok, PKNP drainage and stagnant points within the ICS.

The baseline water quality sampling showed that generally the water quality fall within **Class III limits** of the NWQS.



Ambient Noise Level

Three (3) locations were selected to measure the ambient noise level.

Noise levels recorded at all stations during daytime and nighttime are all **within the permissible limits** stipulated in the Guidelines for Environmental Noise Limits and Control (3rd Ed.).



Air Quality

Four (4) locations were selected to carry out monitoring for 23 pollutants (PM₁₀, PM_{2.5}, SO₂, NO₂, CO, O₃, H₂S, Cl₂, HCl, NH₃, VOCs and heavy metals).

All parameters are well **below the stipulated limits** in MAAQS and Ontario Ambient Air Quality Criteria throughout the monitoring period.

WASTE MANAGEMENT



Solid Waste Management

Nearest disposal facility is **Tapak Pelupusan Jabor Jerangau** (~4.3km from Project site)



Scheduled Waste Management

Managed according to an existing **Scheduled Waste Management Plan (SWMP)**

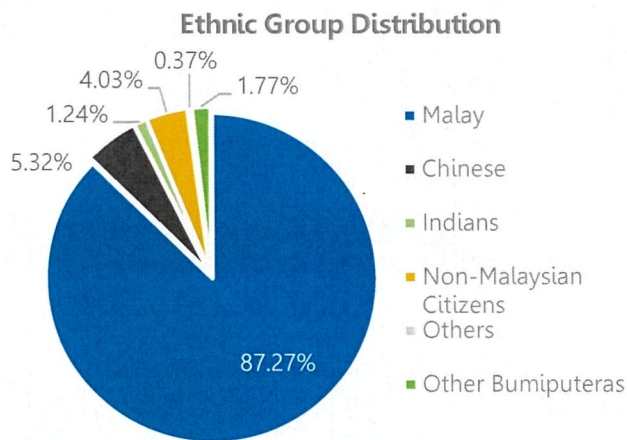
EXISTING TRAFFIC CONDITION



Access roads – Gebeng Bypass, Jalan Pintasan Kuantan and Jalan Gebeng 1/11, all have Level of Service (LOS) A.

SOCIO-ECONOMIC PROFILE

The mukim that the proposed Project is located is Sungai Karang, which has a projected population of **69,312** in 2020.



Household: 15,206
Living Quarters: 17,030



Age Group

< 15	37.45%
15 – 64	60.24%
≥ 65	2.32%



Dependency Age Ratio

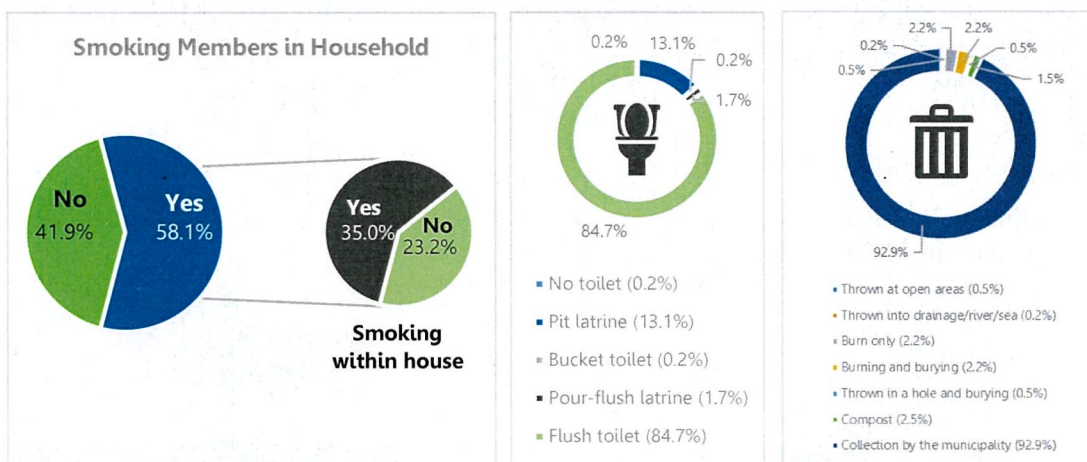
Sg. Karang 66.01%

Zone of Influence (ZOI)

The Zone of Influence (ZOI) covering within a 5km radius of the Project site involves residential areas, institutions and public amenities.








EXISTING PUBLIC HEALTH






7 & 8 | IMPACT ASSESSMENTS AND MITIGATION MEASURES

CONSTRUCTION STAGE

Environmental Elements	Potential Impacts	Proposed Mitigation Measures
 <p>Air Quality</p>	<p>Fugitive dust generation when particulates are lifted into the air from movement of construction vehicles and minor earthmoving activities</p> <p>Impact Magnitude: ○ Not Significant</p>	<ul style="list-style-type: none"> ▪ Erect hoarding or equivalent barriers around the construction area ▪ Regular water spraying of construction site, particularly along haul roads ▪ Cover stockpiles and vehicles carrying earth, sand or aggregate to control fugitive dust emissions ▪ Impose speed limits within construction site ▪ Fuel-efficient and well-maintained equipment to be used
 <p>Noise</p>	<p>Temporary increase in ambient noise levels due to construction works and increment of vehicular movement</p> <p>Impact Magnitude: ○ Not Significant</p>	<ul style="list-style-type: none"> ▪ Avoid unnecessary revving of engines and switch off equipment when not required ▪ Noisy equipment or activities should be replaced by less noisy alternatives ▪ Good maintenance of equipment ▪ Machines such as cranes should be shut down between work periods / throttled down to a minimum ▪ Materials should be lowered whenever practicable

Environmental Elements	Potential Impacts	Proposed Mitigation Measures
 <p>Water Quality</p>	<ul style="list-style-type: none"> ▪ River water pollution due to surface runoff ▪ Accidental discharge or spillage of petroleum products and scheduled wastes causing contamination of waterways ▪ Sewage and sullage generation from temporary toilet facilities <p>Impact Magnitude: ● Low</p>	<ul style="list-style-type: none"> ▪ Ensure that all mitigation measures stipulated in ESCP shall be implemented and maintained ▪ Sediment basins shall be inspected and desilted on a regular basis ▪ Denuded stretches must be re-vegetated after construction works ▪ Proper housekeeping and hygiene to be maintained at all times for toilet facilities ▪ Storage and handling of scheduled wastes to be carried out according to the EQ (Scheduled Wastes) Regulations, 2005
 <p>Waste Management</p>	<p><u>Solid Waste</u></p> <ul style="list-style-type: none"> ▪ Collection of water by wastes, which will become breeding grounds for pests which transmit diseases ▪ Illegal open burning will cause air pollution ▪ Debris may potentially clog drains, causing flash floods during rainy seasons <p><u>Scheduled Waste</u></p> <ul style="list-style-type: none"> ▪ Accidental spillage or leakages will deteriorate water quality of nearest river ▪ Illegal burning may expose nearby receptors to hazardous pollutants <p>Impact Magnitude: ● Low</p>	<p><u>Solid Waste</u></p> <ul style="list-style-type: none"> ▪ Development and implementation of suitable Waste Management Plan is encouraged ▪ Management of waste according to waste management hierarchy: refuse, reduce, reuse, recycle, recover and disposal <p><u>Scheduled Waste</u></p> <ul style="list-style-type: none"> ▪ Management of scheduled waste in accordance with the Guidelines for Packaging, Labelling and Storage of Scheduled Wastes in Malaysia published by DOE ▪ Scheduled wastes to be stored and managed according to the existing Scheduled Waste Management Plan
 <p>Socio-Economic Study</p>	<ul style="list-style-type: none"> ▪ Traffic congestion ▪ Public safety and disturbance to routine daily travels ▪ Social unrest from incoming foreign workers ▪ Increase income to surrounding businesses and services <p>Impact Magnitude: ● Low</p>	<ul style="list-style-type: none"> ▪ Develop a hotline/channel for complaints ▪ Implement proposed mitigation measures ▪ Implement Traffic Management Plan ▪ Prioritize locals for employment and business opportunities ▪ Ongoing public involvement from Project Proponent

OPERATION STAGE

Environmental Elements	Potential Impacts	Proposed Mitigation Measures
 <p>Air Quality</p>	<p>Thermal treatment of off gases containing mainly oxygen and hydrogen will be converted to combustion gases like nitrogen oxides, which can affect the health of nearby population</p> <p>Impact Magnitude: <input type="radio"/> Low</p>	<ul style="list-style-type: none"> ▪ Oxygen concentration inside the combustion chamber has to be measured and controlled by variation of air flow ▪ Thermal oxidizer (TOX) at Aroma Complex has to be shut down if the flue gas oxygen content falls below 2% vol. ▪ During high organic load or high amount of hydrogen containing off gases, the natural gas flow has to be reduced to the minimum required amount of natural gas burner ▪ Steam injection system shall be installed for HP flare stack ▪ Preventive maintenance of HP flare stack and Aroma TOX components shall be carried out regularly
 <p>Greenhouse Gas Emission</p>	<p>Emission of GHG from combustion of fossil fuel (natural gas) for the generation of steam</p> <p>Impact Magnitude: <input type="radio"/> Not significant</p>	<p><u>BASF PETRONAS Chemicals Sustainability Pillars</u></p> <ul style="list-style-type: none"> ▪ Establish integrated energy management dashboard ▪ Define pathway to net zero for achieving target and incorporate plan into site development plan ▪ Collation of data from all OPEX projects related to climate protection under one umbrella ▪ Strategic analysis for every waste created on site from 4R perspective ▪ Review existing disposal principles ▪ Focus on non-hazardous waste management
 <p>Noise</p>	<p>Increase in ambient noise levels from processing equipment</p> <p>Impact Magnitude: <input type="radio"/> Not significant</p>	<ul style="list-style-type: none"> ▪ Provide proper enclosures for noisy equipment ▪ Regular maintenance of the equipment ▪ Practice SOPs ▪ Provide workers with PPEs

Environmental Elements	Potential Impacts	Proposed Mitigation Measures
 <p>Risk</p>	<p>Risk of fire, explosion or release of dangerous substances, such as 2-ethylhexanoic acid, 2-ethylhexanal, 2-ethylhexanol, hydrogen, n-butanal, heptyl formate and undecanol</p> <p>Impact Magnitude: <input type="radio"/> Low</p>	<ul style="list-style-type: none"> ▪ Existing ICS's ERP shall be updated to address all potential scenarios identified in the QRA ▪ Design changes during the engineering phases post EIA should be analysed to determine the severity of potential hazards ▪ Safety report and ERP shall be updated and submitted to the DOSH Major Hazard Division 3 months prior to commissioning ▪ Implementation of an effective health and safety management system
 <p>Health Impact Assessment</p>	<ul style="list-style-type: none"> ▪ Health impacts (mainly secondary impacts) upon the human community that emanate from primary impacts upon the physical (air, water and soil), biological (Animals and plants) and social environment ▪ Main health impacts emanating from human exposure to air pollutants through direct inhalation <p>Impact Magnitude: <input type="radio"/> Low</p>	<ul style="list-style-type: none"> ▪ Preventive measures to be undertaken to control fugitive dust and vehicular emissions during construction stage ▪ Control of disease vectors and reservoirs should be carried out during construction phase ▪ Contingency plan like plant shutdown and an emergency response plan must be in place to cater for abnormal Project operation
 <p>Water Quality</p>	<p>Wastewater generation from the existing WWTP and accidental leakage or spillages from scheduled wastes will cause deterioration of nearby waterways</p> <p>Impact Magnitude: <input type="radio"/> Low</p>	<ul style="list-style-type: none"> ▪ Discharge to comply with Standard B limits as prescribed in the Environmental Quality (Industrial Effluent) Regulation 2009 ▪ Operation of WWTP to strictly adhere to the existing WWTP Manual

Environmental Elements	Potential Impacts	Proposed Mitigation Measures
 <p>Waste Management</p>	<p><u>Solid Waste</u></p> <ul style="list-style-type: none"> Collection of water by wastes, which will become breeding grounds for pests which transmit diseases Illegal open burning will cause air pollution Debris may potentially clog drains, causing flash floods during rainy seasons <p><u>Scheduled Waste</u></p> <ul style="list-style-type: none"> Accidental spillage or leakages will deteriorate water quality of nearest river Illegal burning may expose nearby receptors to hazardous pollutants <p>Impact Magnitude: ● Low</p>	<p><u>Solid Waste</u></p> <ul style="list-style-type: none"> Development and implementation of suitable Waste Management Plan is encouraged Management of waste according to waste management hierarchy: refuse, reduce, reuse, recycle, recover and disposal <p><u>Scheduled Waste</u></p> <ul style="list-style-type: none"> Management of scheduled waste in accordance with the Guidelines for Packaging, Labelling and Storage of Scheduled Wastes in Malaysia published by DOE Scheduled wastes to be stored and managed according to the existing Scheduled Waste Management Plan
 <p>Socio-Economic Study</p>	<ul style="list-style-type: none"> Air and odour pollution from factory Fire risk Traffic congestion Public safety Increase income to surrounding businesses and services Addition and improvement of infrastructure Encourage provision of public services <p>Impact Magnitude: ● Low</p>	<ul style="list-style-type: none"> Effective safety measures in the plant area to prevent accidents Implement proposed mitigation measures Use environmentally processes in the plant Setting of quotas for local employment CSR program with nearby residents / institutions

PROJECT ABANDONMENT

In the event that the Project is abandoned, the following measures shall be taken:



9 | ENVIRONMENTAL MANAGEMENT PLAN (EMP)

CONSTRUCTION STAGE



Water Quality

Performance Monitoring – Weekly monitoring or after rainfall event of > 12.5mm for all ESCP on site

Compliance Monitoring – Monthly monitoring or after rainfall event of > 12.5 mm for silt trap or sediment basin discharge; Quarterly monitoring for septic tank

Impact Monitoring – Quarterly monitoring at six (6) existing monitoring points (W1 to W6)

Ambient Noise Level

Impact Monitoring – Quarterly monitoring at three (3) existing monitoring points (N1 to N3)

Environmental Audit

To carry out **once every four (4) months** within the Project site

OPERATION STAGE



Water Quality

Performance Monitoring – Weekly monitoring for WWTP
Compliance Monitoring – Monthly monitoring for discharge from WWTP
Impact Monitoring – Quarterly monitoring at six (6) existing monitoring points (W1 to W6)



Ambient Noise Level

Impact Monitoring – Quarterly monitoring at three (3) existing monitoring points (N1 to N3)



Air Quality

Compliance Monitoring – Quarterly monitoring at Citral TOX stack (XX-9680)
Impact Monitoring – Quarterly monitoring at three (3) existing monitoring points (A1 to A3)



Environmental Audit

To carry out **annually** within the Project site

10 | STUDY FINDINGS



Construction Stage

Impacts of **air quality** and **noise** are expected to be **not significant**, whereas impacts of Project construction on **water quality, waste management** and **socio-economic** are expected to be **low**

Operation Stage

Impacts of **GHG** and **noise** are expected to be **not significant**, whereas impacts of Project operation on **air quality, water quality, waste management, risk, health** and **socio-economic** are expected to be **low**

